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(54)【考案の名称】　ブラシレスモータ

【実用新案登録請求の範囲】

【請求項１】永久磁石より成るロータと、その周囲に配設された複数の励磁コイルと、感磁性素子等のロータ位置検出部材と、このロータ位置検出部材の信号に基づいて上記励磁コイルの電流切換えを行う転流回路と、これらロータ等を収納する収納ケースとを備えたブラシレスモータにおいて、

上記収納ケースの前後面カバーのうち少なくとも一方のカバーを、磁性材によって上記ロータの磁極数ｎに対応したｎ角形状に形成し、前記ロータ位置検出部材を上記カバーの一辺上に位置するように配設したことを特徴とするブラシレスモータ。

【請求項２】前記ロータは、環状の永久磁石から成り、その内周に複数枚の羽根部材が固定され、また前記収納ケースの前後面には送風用の円形の開口が形成されていることを特徴とする実用新案登録請求の範囲第１項記載のブラシレスモータ。

【考案の詳細な説明】

（産業上の利用分野）

本考案は、ブラシレスモータに関し、一層詳しくは、起動を円滑に行い得るブラシレスモータに関するものである。

（従来技術）

一般にブラシレスモータでは、永久磁石より成るロータＲと、その周囲に配設された複数の励磁コイルＣ（駆動コイル）と、感磁性素子等のロータ位置検出部材Ｓと、このロータ位置検出部材Ｓの信号に基づいて上記励磁コイルＣの電流切換えを行う転流回路と、これらロータＲ等を収納する収納ケースＫとから構成されている。

そして、上記ロータＲは、固定された他の部材に対する

磁極の相対的な位置が回転に伴なって変化する。このため、この種のモータは一旦駆動させると、ロータRをその磁極が励磁コイルCに対して望みの位置にくるように停止させることができない。

従って、従来のこの種のモータでは、第6図に示すように励磁コイルCとロータRの磁極とが丁度対向するような位置にロータRが停止してしまうことがある。このような場合、モータを再起動させようとすると、モータはすぐにその回転角に対するトルクの谷部に落こんでしまってスムースな起動が期待できなくなる。このことは、励磁コイルCに適切な励磁を行うために、感磁性素子や磁極飽和素子などのロータ位置検出部材Sを配設した場合といえども同様である。しかも、ロータRが同図のような停止位置にある場合、磁極と磁極の境目がロータ位置検出部材Sと対向するため、磁極検出部材Sが十分に動作しなかったり、あるいは誤動作によって逆転したりする結果となる。

（目的）

本考案の目的は、上記した従来技術の抱える問題を解決し、ロータを励磁コイルに対して常時一定の位置、即ち起動時にデッドポイントを生じさせない位置に停止させることができ、またロータ位置検出部材もその作動を適正に行い得るブラシレスモータを提供することにある。

（問題点を解決するための手段）

上記問題点を解決するため、本考案のブラシレスモータは、永久磁石より成るロータと、その周囲に配設された複数の励磁コイルと、感磁性素子等のロータ位置検出部材と、このロータ位置検出部材の信号に基づいて上記励磁コイルの電流切換えを行う転流回路と、これらロータ等を収納する収納ケースとを備えたブラシレスモータにおいて、上記収納ケースの少なくとも前面カバーを、磁性材によって上記ロータの磁極数nに対応したn角形状に形成し、前記ロータ位置検出部材を上記前面カバーの一辺上に位置するように配設したことに特徴がある。

（作用）

本考案においては、磁極数がnのマグネットロータと、この磁極数に対応するn角形状の収納ケースカバー体と所定位置に配設されるロータ位置検出部材との組合せにより、n極マグネットロータを望みの定位置に停止させ、起動をスムースに行えるようにした。

（実施例）

以下、本考案の一実施例を、図面に基づいて詳細に説明する。

第1図及び第2図は、本発明をカーオーディオの冷却ファンの駆動モータとして実施した場合の一実施例を示すもので、第1図はそのモータの分解斜視図、第2図はその要部の正面図である。

第1、2図において、図中符号1はモータ本体を収納する収納ケースで、この収納ケース1は四角形状の背面プレート3と、この背面プレート3によって開放面が閉塞

される函状の前面カバー2とから成っている。背面プレート3は非磁性材あるいは磁性材によって形成され、中央部に後述するロータ9を回動自在に枢支する軸受部4が垂直に立設されると共にその周囲に十字状のブリッジ部5を残して窓孔6が穿たれている。

前面カバー2は鉄板等の磁性材によって形成され、その前面には上記背面プレート3の窓孔6と対応する円形の窓孔2aが設けられ、内部四隅には第2図に示すようにそれぞれ励磁コイル7,8が配設され、互いに対向するコイル同志は直結されて2相のコイルを形成している。

9は上述したロータで、中心の軸11の外周にファン10が固着され、このファン10の外周に鉄性のリング体を介して環状の永久磁石12が固着されている。この永久磁石12は4極に等分に着磁されている。

13は前面カバー2の一辺上、即ち前面カバー2の隣接する2つの隅部間であって、上記ロータ9の回転領域外側の近接位置に配設されたホール素子で、ロータ9の磁極の磁束を受けて出力電圧を発生させ、隣接するコイル7、8のいずれか一方又もしくは8にコイル電流を流してコイル7、8を所定の磁極に励磁させる。

また、第3図はロータ9の駆動回路DICを制御するための制御回路図を示している。同図において、1対のコイル7、8の一端は共通接続され、その接続点はダイオードD1の端子①②に接続されている。抵抗R1の一端はダイオードD1と正直流端子Vccとの間に接続され、他端には抵抗R2とコンデンサC1が接続されている。上記抵抗R1と抵抗R2との間には、ホール素子13の保護抵抗R3の一方端が接続され、他方端にはホール素子13が接続され、このホール素子13より駆動回路DICの端子④⑤に接続されている。そして、ホール素子13がロータ9のS極を感知したときには、端子④が高出力を生じ、コイル7が通電する一方、ホール素子13がロータ9のN極を感知したときには、端子⑤が高出力を生じ、コイル8が通電する。

尚、ダイオードD1は正直流端子Vccへの逆流を防止するためのもの、抵抗R3はホール素子13を定角電流値内で動作させるためのものであり、更に駆動回路DICの端子⑥には電流制限時定数回路が接続され、例えばなんらかの原因でロータ9の回転が強制的に停止された場合、抵抗R3、コンデンサC1の時定数で決定された時間後、コイルへの通電がたたれ、モータの異常発熱を防止する。

而して上記モータの使用状態を説明すると、先ず、停止状態においてロータ9が第4図（イ）に示す位置にあるとき、ホール素子13はS極を感知して第3図の駆動回路DICの端子④に出力信号が入り、コイルが通電されてN極となり上記S極を吸引する。ロータ9が反時計方向に45度回転すると、ホール素子13はN極を感知し、端子⑤に出力信号が入り、端子②がONされてコイルを通電し、同コイルをN極に励磁させる。このとき、端子①はOFFされている。この結果、ロータ9は更に45度反時計方向に回転し（第4図ロ参照）、この動作を繰返すことで回

5

転を継続する。回転継続中においては、前面カバー２は磁性材によって形成されているけれども、ロータ９の回転力に影響を与えることはない。

そして、電源がOFFされてコイル７、８への通電が断たれると、ロータ９はその慣性力により回転速度を落としつつ徐々に停止する。ロータ９が回転を停止する間際になると、前面カバー２がロータ９の近づいてきた磁極によって磁気誘導を受ける。この磁気誘導は、各磁極の最強の磁力を有する磁極部が前面カバー２の各辺に最も近づいた所で行われ、第５図（イ）（ロ）に見られるような磁路M1～M4がそれぞれ形成されてロータ９はこの位置で停止する。

こうした磁気誘導によって停止するロータ９の位置は、磁極と磁極の境目が前面カバー２の隅部方向を向き、上記磁極部が前面カバー２の辺上に位置するため、そのうちの１つの磁極部はホール素子13と対向することとなる。

このため、モータを再起動させる際にホール素子13は磁極を確実に検出して励磁コイル7,8を誤動作させることがない。また、各磁極の磁極部が励磁コイル7,8間に位置するため、始動直後に回転トルクの谷間に落ち込むことがなくなってスムースに回転するものである。

このように、本実施例においては、四角形状の前面カバー２を用いることにより、４極マグネットロータ９を起動に支障のない定位置に停止させることができ、次の起動をスムースに行うことができる。

上記した実施例では、４極マグネットロータと四角形状の前面カバーの組合せについて説明したが、本考案はこうした磁極数及び角数に限定されるものではなく、マグネットロータの磁極数ｎに対応したｎ角形状の収納ケース前面カバーを用いるようにすれば、本実施例を同様な作用効果を奏し得るものである。

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6

＊また、上記実施例では、マグネットロータを所定の位置に停止させるために収納ケースの前面カバーを磁性材によって所定の形状に形成するようにしたが、本考案はこの他、収納ケースの背面プレートあるいは背面カバーを上記実施例の前面カバーと同様の構成にすることによってもその効果を達成し得るものである。

（考案の効果）

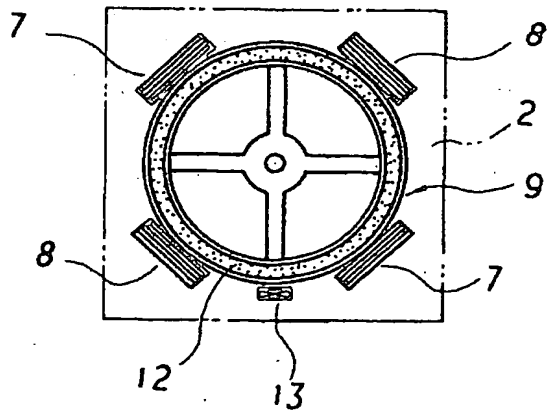
以上説明したように、本考案によれば、モータ本体の収納ケースの前後面カバーのうち少なくとも一方のカバーを、磁性材によって上記ロータの磁極数ｎに対応したｎ角形状に形成する一方、ロータ位置検出部材を上記カバーの隣接する隅部の間に位置するように配設したので、ロータは回転停止間際になると、その各磁極が上記カバーの一辺から隣接する他辺へと磁路を形成することによって停止され、従って、こうした磁路を形成するような位置で停止されたロータは自然と１つの磁極がロータ位置検出部材と対向することとなり、起動時にはその磁極を確実に検出してデッドポイントを生じさせることなく、ロータのスムースな回転を保障するものである。

【図面の簡単な説明】

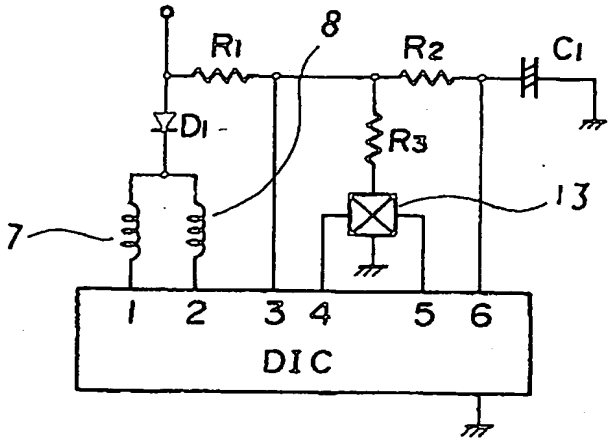
第１図は本考案の一実施例を示すブラシレスモータの分解斜視図、第２図は第１図におけるブラシレスモータのロータ内側のファンを取去った状態の正面図、第３図はロータの駆動回路を制御する制御回路図、第４図（イ）、（ロ）は回転原理を説明するための図、第５図（イ）、（ロ）は本考案のブラシレスモータの停止・起動を説明するための図、第６図は従来のブラシレスモータの問題点を説明するための図である。

1:収納ケース、2:前面カバー、3:背面プレート、7,8:励磁コイル（駆動コイル）、9:ロータ、12:永久磁石、13:ホール素子、M:磁路、C:励磁コイル、R:ロータ、S:ロータ位置検出部材。

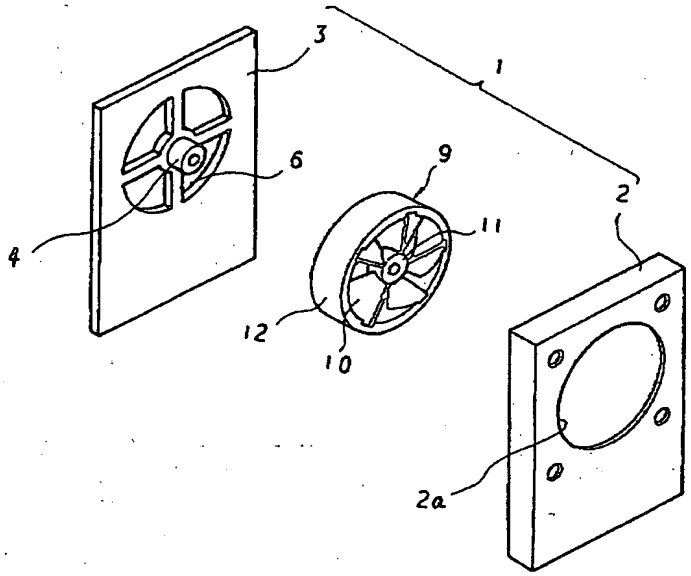
【第２図】



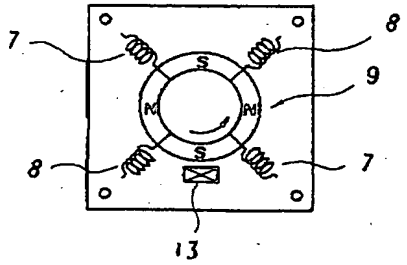
【第３図】



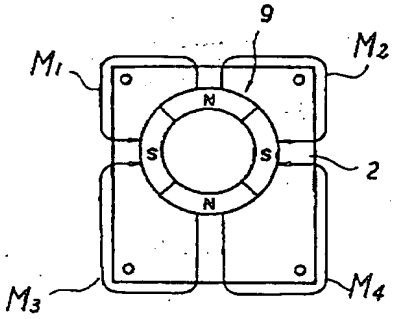
【第1図】



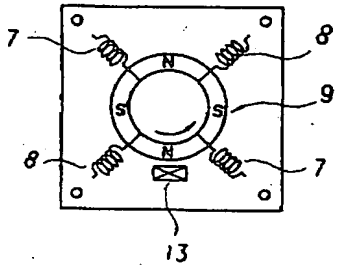
【第4図（イ）】



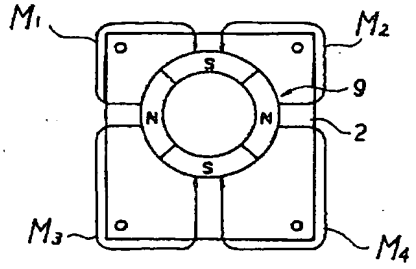
【第5図（ロ）】



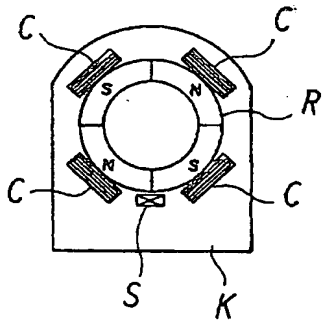
【第4図（ロ）】



【第5図（イ）】



【第6図】



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CLAIMS

[Utility model registration claim]
[Claim 1] Rota which consists of a permanent magnet, and two or more exiting coils arranged in the perimeter, In the brushless motor equipped with the Rota location detecting-element material, such as a magnetosensitive nature component, the commutation circuit which performs current-switching of the above-mentioned exiting coil based on the signal of this Rota location detecting-element material, and the receipt case which contains these Rota etc. The brushless motor characterized by having formed one [at least] covering by magnetic material among the above-mentioned receipt case order side coverings in the shape of [corresponding to the several n magnetic pole of above-mentioned Rota] an n square shape, and arranging said Rota location detecting-element material so that it may be located on one side of the above-mentioned covering.
[Claim 2] Said Rota is a brushless motor given in the 1st term of a utility model registration claim characterized by consisting of an annular permanent magnet, and fixing two or more wing member to the inner circumference, and forming circular opening for ventilation in said receipt case order side.

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DETAILED DESCRIPTION

[Detailed explanation of a design]
(Field of the Invention)
This design is related with the brushless motor which can start smoothly much more in detail about a brushless motor.
(Conventional technique)
Generally it consists of two or more exiting coil C (drive coil) arranged in Rota R which consists of a permanent magnet, and its perimeter, a commutation circuit which performs current-switching of above-mentioned exiting coil C based on the signal of the Rota location detecting-element material S, such as a magnetosensitive nature component, and this Rota location detecting-element material S, and a receipt case K which contains these Rota R etc. at the brushless motor.
And the relative location of the magnetic pole to other members to which above-mentioned Rota R was fixed changes with rotation. For this reason, if it is made to once drive, this kind of motor cannot be stopped so that that magnetic pole may come Rota R to the location of a wish to exiting coil C.
Therefore, by this conventional kind of motor, Rota R may stop in a location where exiting coil C and the magnetic pole of Rota R counter exactly as shown in Fig. 6 . Shortly after rebooting a motor, it becomes impossible in such a case, for a motor to expect starting with smooth stripes from the trough of torque to the angle of rotation by ******. In order to perform suitable excitation for exiting coil C, also although this calls it the case where the Rota location detecting-element material S, such as a magnetosensitive nature component and a magnetic pole saturation component, is arranged, it is the same. And when Rota R is located in a halt location as shown in this drawing, in order that the boundary line of a magnetic pole and a magnetic pole may counter with the Rota location detecting-element material S, a result which the magnetic pole detecting-element material S does not fully operate, or is reversed by malfunction is brought.
(Purpose)
The purpose of this design is to offer the brushless motor to which the problem which the above-mentioned conventional technique has can be solved, and a fixed location, i.e., the location which does not produce the dead point at the time of starting, can be made to always stop Rota to an exiting coil, and the Rota location detecting-element material can also perform the actuation proper.
(Means for solving a trouble)
In order to solve the above-mentioned trouble, the brushless motor of this design Rota which consists of a permanent magnet, and two or more exiting coils arranged in the perimeter, In the brushless motor equipped with the Rota location detecting-element material, such as a magnetosensitive nature component, the commutation circuit which performs current-switching of the above-mentioned exiting coil based on the signal of this Rota location detecting-element material, and the receipt case which contains these Rota etc. At least, a front cover is formed by magnetic material in the shape of [of the above-mentioned receipt case / corresponding to the several n magnetic pole of above-mentioned Rota] an n square shape, and the description is to have arranged said Rota location detecting-element material so that it might be located on one side of the above-mentioned front cover.
(Operation)
The number of magnetic poles enabled it to start smoothly by stopping the orientation of a wish of n pole magnet rotor in this design with the combination of the receipt case covering object of the shape of an n square shape corresponding to the magnet rotor and this number of magnetic poles of n, and the Rota location detecting-element material arranged in a predetermined location.
(Example)
Hereafter, one example of this design is explained to a detail based on a drawing.
Figs. 1 and 2 show one example at the time of carrying out this invention as a drive motor of the cooling fan of a car audio, Fig. 1 is a decomposition perspective view of the motor, and Fig. 2 is a front view of the important section.
In Fig. 1st [the] and 2, the sign 1 in drawing is the receipt case which contains the body of a motor, and this receipt case 1 consists of the front cover 2 of the shape of a box by which an open field is blockaded with square-like the tooth-back plate 3 and this tooth-back plate 3. The tooth-back plate 3 is formed of nonmagnetic material or magnetic material, while the bearing 4 supported pivotably for Rota 9 later mentioned in the center section, enabling free rotation is set up perpendicularly, it leaves the cross-joint-like bridge section 5 to the perimeter, and the window hole 6 is dug.
A front cover 2 is formed of magnetic material, such as a griddle, and the window hole 6 of the above-mentioned tooth-back plate 3 and circular corresponding window hole 2a are prepared in the front face, as shown in Fig. 2 , exiting coils 7 and 8 are arranged in internal four corners, respectively, and the coil comrade who counters mutually is linked directly and forms the coil of two phases.
9 is Rota mentioned above, the fan 10 fixed on the periphery of the main shaft 11, and the annular permanent magnet 12 has fixed it through the ferrous ring object on this fan's 10 periphery. This permanent magnet 12 is magnetized by division into equal parts on the four poles.
either of the coils 7 and 8 which 13 is between on one side of a front cover 2 (i.e., two corners where a front cover 2

adjoins), are the hall devices arranged in the contiguity location of the rotation field outside in above-mentioned Rota 9, are made to generate output voltage in response to the magnetic flux of the magnetic pole of Rota 9, and adjoin — moreover — or a coil current is passed to 8 and a predetermined magnetic pole is made to excite coils 7 and 8
 Fig. 3 shows the control circuit Fig. for controlling the drive circuit DIC in Rota 9 again. In this drawing, common connection of the end of one pair of coils 7 and 8 is made, and the node is connected to terminal **** of diode D1. The end of resistance R1 is connected between diode D1 and the forward direct-current terminal Vcc, and resistance R2 and a capacitor C1 are connected to the other end. Between the above-mentioned resistance R1 and resistance R2, the one side edge of the protective resistance R3 of a hall device 13 is connected, a hall device 13 is connected to an another side edge, and it connects with terminal **** of the drive circuit DIC from this hall device 13. And when the hall device 13 has sensed the south pole of Rota 9, while terminal** produces high power and a coil 7 energizes, when the hall device 13 has sensed N pole in Rota 9, terminal ** produces high power and a coil 8 energizes.
In addition, a thing for diode D1 to prevent the back flow to the forward direct-current terminal Vcc, Resistance R3 is for operating a hall device 13 within a constant angle current value. Furthermore, when a current-limiting time constant circuit is connected to terminal [of the drive circuit DIC] **, for example, rotation of Rota 9 is compulsorily suspended by a certain cause, the energization to a coil is left after resistance R3 and the time amount on which it decided with the time constant of a capacitor C1, and abnormality generation of heat of a motor is prevented.
When it **, the busy condition of the above-mentioned motor is explained and Rota 9 is first located in a idle state in the location shown in 4th [**] Fig. (b), the south pole is sensed, an output signal goes into terminal ** of the drive circuit DIC of Fig. 3 , and a coil energizes a hall device 13, it serves as N pole, and attracts the above-mentioned south pole. When Rota 9 rotates 45 degrees counterclockwise, N pole is sensed, an output signal goes into terminal **, terminal ** is turned on, and a hall device 13 energizes a coil, and makes N pole excite this coil. Terminal ** is turned off at this time. Consequently, Rota 9 is rotated counterclockwise further 45 degrees (refer to 4th [**] Fig. RO), and rotation is continued by repeating this actuation. Although the front cover 2 is formed of magnetic material during continuation of rotation, the turning effort of Rota 9 is not affected.
And if a power source is turned off and the energization to coils 7 and 8 is severed, Rota 9 will stop gradually, reducing rotational speed with the inertial force. If Rota 9 becomes just before suspending rotation, a front cover 2 will receive magnetic induction by the magnetic pole which Rota 9 has approached. The magnetic paths M1-M4 as which this magnetic induction is regarded by a line crack and 5th [**] Fig. (b) (b) by Tokoro whom the magnetic pole section which has the strongest magnetism of each magnetic pole approached most each side of a front cover 2 are formed, respectively, and stop Rota 9 in this location.
Since, as for the location of Rota 9 stopped by such magnetic induction, the above-mentioned magnetic pole section is located on the side of a front cover 2 by the boundary line of a magnetic pole and a magnetic pole turning to the direction of a corner of a front cover 2, one of the magnetic pole sections [them] will counter with a hall device 13.
For this reason, in case a motor is rebooted, a hall device 13 detects a magnetic pole certainly, and does not make exiting coils 7 and 8 malfunction. Moreover, since the magnetic pole section of each magnetic pole is located between an exiting coil 7 and 8, immediately after starting, falling in the valley of running torque is lost and it rotates smoothly.
Thus, in this example, by using the square-like front cover 2, the orientation which does not have trouble in starting can be made to be able to stop 4 pole magnet rotor 9, and the next starting can be performed smoothly.
In the above-mentioned example, although the combination of the front cover of the shape of 4 pole magnet rotor and a square was explained, if this design is not limited to such a number of magnetic poles, and the number of angles and the receipt case front cover of the shape of an n square shape corresponding to the several n magnetic pole of a magnet rotor is used, it can do the same operation effectiveness so for this example.
Moreover, although the front cover of a receipt case was formed in the predetermined configuration by magnetic material in the above-mentioned example in order to make a position stop a magnet rotor, in addition to this, this design can attain the effectiveness also by carrying out the tooth-back plate or tooth-back covering of a receipt case to the same configuration as the front cover of the above-mentioned example.
(Effectiveness of a design)
As explained above, according to this design, among receipt case order side coverings of the body of a motor one [at least] covering Since the Rota location detecting-element material was arranged so that it might be located between the corners where the above-mentioned covering adjoins while forming by magnetic material in the shape of [corresponding to the several n magnetic pole of above-mentioned Rota] an n square shape It is stopped by forming a magnetic path in the other sides where each of that magnetic pole adjoins from one side of the above-mentioned covering, if Rota becomes just before a rotation halt. Therefore, nature and one magnetic pole will counter with the Rota location detecting-element material, and Rota stopped in a location which forms such a magnetic path secures smooth rotation of Rota, without detecting the magnetic pole certainly at the time of starting, and producing the dead point.

[Translation done.]

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TECHNICAL FIELD

(Field of the Invention)
This design is related with the brushless motor which can start smoothly much more in detail about a brushless motor.

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PRIOR ART

(Conventional technique)
Generally it consists of two or more exiting coil C (drive coil) arranged in Rota R which consists of a permanent magnet, and its perimeter, a commutation circuit which performs current-switching of above-mentioned exiting coil C based on the signal of the Rota location detecting-element material S, such as a magnetosensitive nature component, and this Rota location detecting-element material S, and a receipt case K which contains these Rota R etc. at the brushless motor.
And the relative location of the magnetic pole to other members to which above-mentioned Rota R was fixed changes with rotation. For this reason, if it is made to once drive, this kind of motor cannot be stopped so that that magnetic pole may come Rota R to the location of a wish to exiting coil C.
Therefore, by this conventional kind of motor, Rota R may stop in a location where exiting coil C and the magnetic pole of Rota R counter exactly as shown in Fig. 6 . Shortly after rebooting a motor, it becomes impossible in such a case, for a motor to expect starting with smooth stripes from the trough of torque to the angle of rotation by ******. In order to perform suitable excitation for exiting coil C, also although this calls it the case where the Rota location detecting-element material S, such as a magnetosensitive nature component and a magnetic pole saturation component, is arranged, it is the same. And when Rota R is located in a halt location as shown in this drawing, in order that the boundary line of a magnetic pole and a magnetic pole may counter with the Rota location detecting-element material S, a result which the magnetic pole detecting-element material S does not fully operate, or is reversed by malfunction is brought.
(Purpose)
The purpose of this design is to offer the brushless motor to which the problem which the above-mentioned conventional technique has can be solved, and a fixed location, i.e., the location which does not produce the dead point at the time of starting, can be made to always stop Rota to an exiting coil, and the Rota location detecting-element material can also perform the actuation proper.

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EFFECT OF THE INVENTION

(Effectiveness of a design)
As explained above, according to this design, among receipt case order side coverings of the body of a motor one [at least] covering Since the Rota location detecting-element material was arranged so that it might be located between the corners where the above-mentioned covering adjoins while forming by magnetic material in the shape of [corresponding to the several n magnetic pole of above-mentioned Rota] an n square shape It is stopped by forming a magnetic path in the other sides where each of that magnetic pole adjoins from one side of the above-mentioned covering, if Rota becomes just before a rotation halt. Therefore, nature and one magnetic pole will counter with the Rota location detecting-element material, and Rota stopped in a location which forms such a magnetic path secures smooth rotation of Rota, without detecting the magnetic pole certainly at the time of starting, and producing the dead point.

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MEANS

(Means for solving a trouble)
In order to solve the above-mentioned trouble, the brushless motor of this design Rota which consists of a permanent magnet, and two or more exiting coils arranged in the perimeter, In the brushless motor equipped with the Rota location detecting-element material, such as a magnetosensitive nature component, the commutation circuit which performs current-switching of the above-mentioned exiting coil based on the signal of this Rota location detecting-element material, and the receipt case which contains these Rota etc. At least, a front cover is formed by magnetic material in the shape of [of the above-mentioned receipt case / corresponding to the several n magnetic pole of above-mentioned Rota] an n square shape, and the description is to have arranged said Rota location detecting-element material so that it might be located on one side of the above-mentioned front cover.

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OPERATION

(Operation)
The number of magnetic poles enabled it to start smoothly by stopping the orientation of a wish of n pole magnet rotor in this design with the combination of the receipt case covering object of the shape of an n square shape corresponding to the magnet rotor and this number of magnetic poles of n, and the Rota location detecting-element material arranged in a predetermined location.

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EXAMPLE

(Example)
Hereafter, one example of this design is explained to a detail based on a drawing.
Figs. 1 and 2 show one example at the time of carrying out this invention as a drive motor of the cooling fan of a car audio, Fig. 1 is a decomposition perspective view of the motor, and Fig. 2 is a front view of the important section.
In Fig. 1st [the] and 2, the sign 1 in drawing is the receipt case which contains the body of a motor, and this receipt case 1 consists of the front cover 2 of the shape of a box by which an open field is blockaded with square-like the tooth-back plate 3 and this tooth-back plate 3. The tooth-back plate 3 is formed of nonmagnetic material or magnetic material, while the bearing 4 supported pivotably for Rota 9 later mentioned in the center section, enabling free rotation is set up perpendicularly, it leaves the cross-joint-like bridge section 5 to the perimeter, and the window hole 6 is dug.
A front cover 2 is formed of magnetic material, such as a griddle, and the window hole 6 of the above-mentioned tooth-back plate 3 and circular corresponding window hole 2a are prepared in the front face, as shown in Fig. 2 , exiting coils 7 and 8 are arranged in internal four corners, respectively, and the coil comrade who counters mutually is linked directly and forms the coil of two phases.
9 is Rota mentioned above, the fan 10 fixed on the periphery of the main shaft 11, and the annular permanent magnet 12 has fixed it through the ferrous ring object on this fan's 10 periphery. This permanent magnet 12 is magnetized by division into equal parts on the four poles.
either of the coils 7 and 8 which 13 is between on one side of a front cover 2 (i.e., two corners where a front cover 2 adjoins), are the hall devices arranged in the contiguity location of the rotation field outside in above-mentioned Rota 9, are made to generate output voltage in response to the magnetic flux of the magnetic pole of Rota 9, and adjoin — moreover — or a coil current is passed to 8 and a predetermined magnetic pole is made to excite coils 7 and 8
Moreover, Fig. 3 shows the control circuit Fig. for controlling the drive circuit DIC in Rota 9. In this drawing, common connection of the end of one pair of coils 7 and 8 is made, and the node is connected to terminal **** of diode D1. The end of resistance R1 is connected between diode D1 and the forward direct-current terminal Vcc, and resistance R2 and a capacitor C1 are connected to the other end. Between the above-mentioned resistance R1 and resistance R2, the one side edge of the protective resistance R3 of a hall device 13 is connected, a hall device 13 is connected to an another side edge, and it connects with terminal **** of the drive circuit DIC from this hall device 13. And when the hall device 13 has sensed the south pole of Rota 9, while terminal ** produces high power and a coil 7 energizes, when the hall device 13 has sensed N pole in Rota 9, terminal ** produces high power and a coil 8 energizes.
In addition, a thing for diode D1 to prevent the back flow to the forward direct-current terminal Vcc, Resistance R3 is for operating a hall device 13 within a constant angle current value. Furthermore, when a current-limiting time constant circuit is connected to terminal [of the drive circuit DIC] **, for example, rotation of Rota 9 is compulsorily suspended by a certain cause, the energization to a coil is left after resistance R3 and the time amount on which it decided with the time constant of a capacitor C1, and abnormality generation of heat of a motor is prevented.
When it **, the busy condition of the above-mentioned motor is explained and Rota 9 is first located in a idle state in the location shown in 4th [**] Fig. (b), the south pole is sensed, an output signal goes into terminal ** of the drive circuit DIC of Fig. 3 , and a coil energizes a hall device 13, it serves as N pole, and attracts the above-mentioned south pole. When Rota 9 rotates 45 degrees counterclockwise, N pole is sensed, an output signal goes into terminal **, terminal ** is turned on, and a hall device 13 energizes a coil, and makes N pole excite this coil. Terminal ** is turned off at this time. Consequently, Rota 9 is rotated counterclockwise further 45 degrees (refer to 4th [**] Fig. RO), and rotation is continued by repeating this actuation. Although the front cover 2 is formed of magnetic material during continuation of rotation, the turning effort of Rota 9 is not affected.
And if a power source is turned off and the energization to coils 7 and 8 is severed, Rota 9 will stop gradually, reducing rotational speed with the inertial force. If Rota 9 becomes just before suspending rotation, a front cover 2 will receive magnetic induction by the magnetic pole which Rota 9 has approached. The magnetic paths M1-M4 as which this magnetic induction is regarded by a line crack and 5th [**] Fig. (b) (b) in the place where the magnetic pole section which has the strongest magnetism of each magnetic pole approached most each side of a front cover 2 are formed, respectively, and stop Rota 9 in this location.
Since, as for the location of Rota 9 stopped by such magnetic induction, the above-mentioned magnetic pole section is located on the side of a front cover 2 by the boundary line of a magnetic pole and a magnetic pole turning to the direction of a corner of a front cover 2, one of the magnetic pole sections [them] will counter with a hall device 13.
For this reason, in case a motor is rebooted, a hall device 13 detects a magnetic pole certainly, and does not make exiting coils 7 and 8 malfunction. Moreover, since the magnetic pole section of each magnetic pole is located between an exiting coil 7 and 8, immediately after starting, falling in the valley of running torque is lost and it rotates smoothly.
Thus, in this example, by using the square-like front cover 2, the orientation which does not have trouble in starting can be made to be able to stop 4 pole magnet rotor 9, and the next starting can be performed smoothly.

In the above-mentioned example, although the combination of the front cover of the shape of 4 pole magnet rotor and a square was explained, if this design is not limited to such a number of magnetic poles, and the number of angles and the receipt case front cover of the shape of an n square shape corresponding to the several n magnetic pole of a magnet rotor is used, it can do the same operation effectiveness so for this example.
Moreover, although the front cover of a receipt case was formed in the predetermined configuration by magnetic material in the above-mentioned example in order to make a position stop a magnet rotor, in addition to this, this design can attain the effectiveness also by carrying out the tooth-back plate or tooth-back covering of a receipt case to the same configuration as the front cover of the above-mentioned example.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
The decomposition perspective view of a brushless motor showing [1] one example of this design, the front view in the condition that Fig. 2 removed the fan inside [Rota] the brushless motor in Fig. 1 , Drawing for drawing for the control circuit Fig. where Fig. 3 controls the drive circuit in Rota, 4th [**] Fig. (b), and (b) to explain a rotation principle, 5th [**] Fig. (b), and (b) to explain a halt and starting of the brushless motor of this design, and Fig. 6 are drawings for explaining the trouble of the conventional brushless motor.
1: A receipt case, 2:front cover, 3:tooth-back plate, 7, 8:exiting coil (drive coil), 9:Rota, 12:permanent magnet, 13:hall device, M:magnetic path, C:exiting coil, R:Rota, S : the Rota location detecting-element material.

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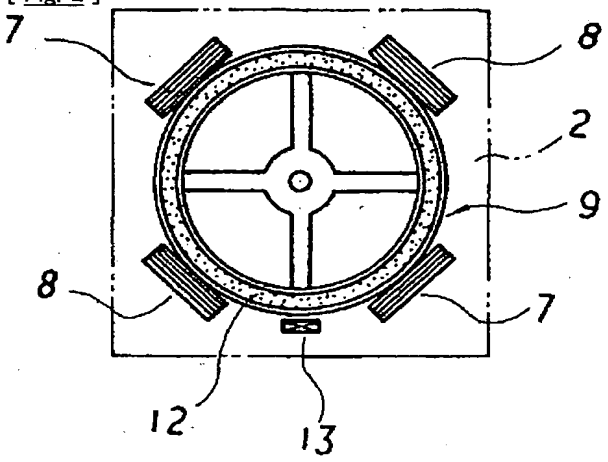
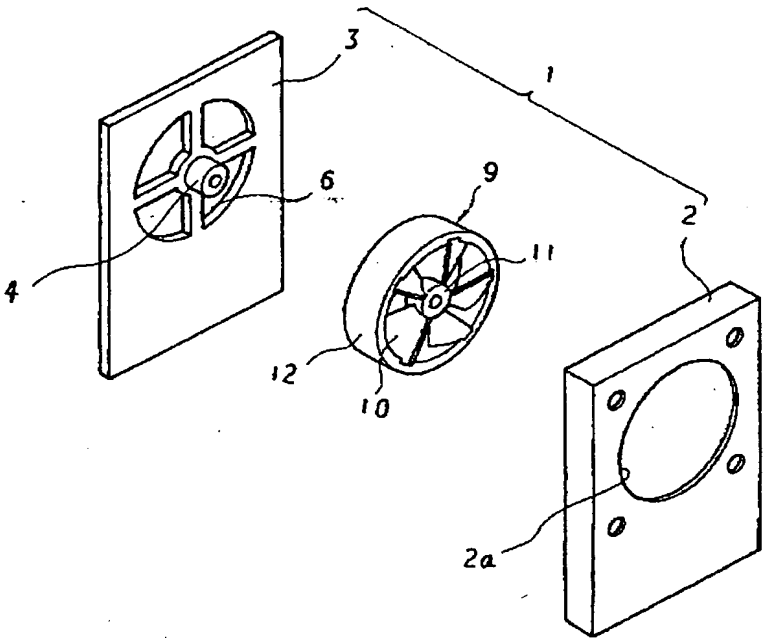
DRAWINGS

[Fig. 2]



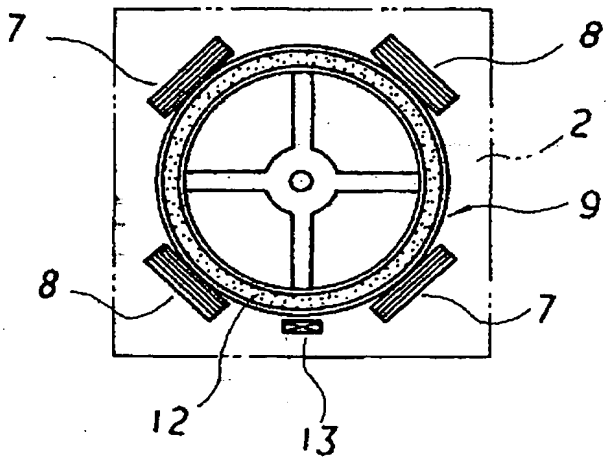
[Fig. 3]

Drawing selection Drawing 1



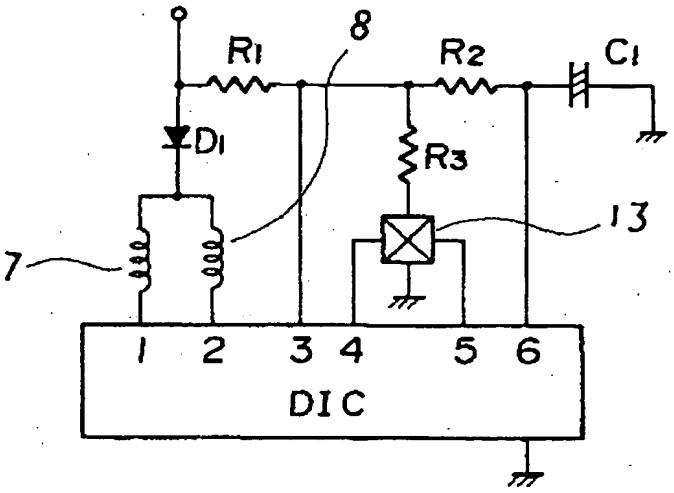
[Translation done.]

Drawing selection Drawing 2



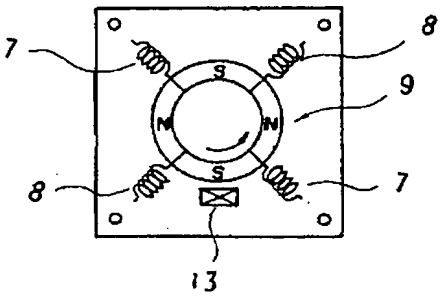
[Translation done.]

Drawing selection Drawing 3



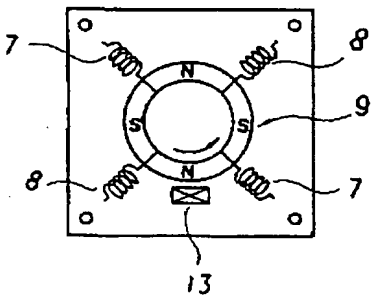
[Translation done.]

Drawing selection 4th [**] Fig. (b)



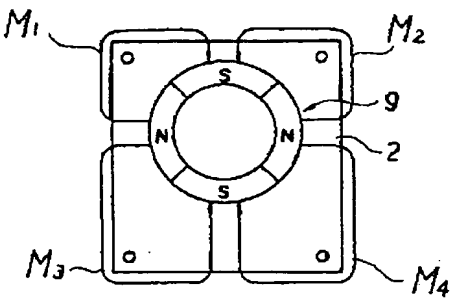
[Translation done.]

Drawing selection 4th [**] Fig. (b)



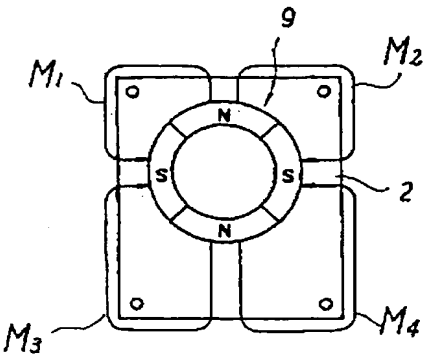
[Translation done.]

Drawing selection 5th [**] Fig. (b)



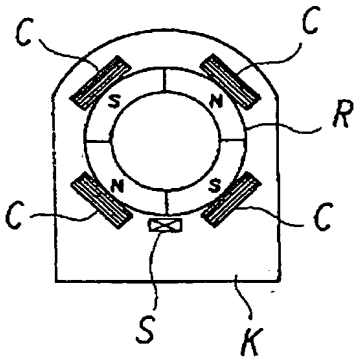
[Translation done.]

Drawing selection 5th [**] Fig. (b)



[Translation done.]

Drawing selection Drawing 6



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